TOWARDS A BETTER HUMAN

The mark 2 human genome: a word of advice from us down here

J D Gillies, P N Le Souef

The present human form is the first draft of a cosmic design. Our concern is that the Designer has derived such amusement from us that He may not proceed further towards perfection.

First models always are defective and improvement is expected in mark 2 versions. The present human is riddled with design errors resulting perhaps from undue haste to get the monkey out of us. This is nothing compared with the camel, of course, which is clearly a prototype raced into production. The following is respectfully submitted for consideration by the Almighty in the mark 2 human genome.

Birth

First children have a higher morbidity than subsequent infants. The second child has the lowest risk and should be born first. This would ensure that parents have more experience since this is their second child, and the risk of frustration-induced child abuse would fall. Possibly children should be born to their grandparents, who have time, experience, patience, and often the wealth required.

Hair

Hair was necessary for protection of the cave man, but now it has been relegated to an art form—serving no function. The more genetically advanced amongst us already lose our hair. Infants are born bald but our Creator has allowed later development of this useless material. We should be bald throughout life.

Brain

Humans have a big brain, which has made our head too large, and we look silly beside an emu. Imagine an architect or engineer designing a heavy controlling unit linked to the main functioning area by a flexible, exposed, and poorly supported device like our neck. Nobody would accept it. Our suggestion encompasses the following principles. The controlling unit (head and brain) should be located within the chest providing added protection and a central location which would reduce nerve connection failures. The eyes should be like those of the garden snail and on retractable stalks, located on the shoulders. This would provide panoramic visibility, and the cosmetics industry would identify a significant advantage with much larger areas to paint.

Breathing

We have created a hazardous atmosphere and inhaling it produces respiratory disease, particularly asthma. The solution is simple. Currently, we breath in, then out. The inward breath draws pollutants into our lungs, causing disease. Breathing should be reversed and we should exhale before breathing in. This would ensure we are continually pumping foreign material back into the atmosphere. Passive smoking would be eliminated and asbestos could again become a valuable construction material. Lung cancer would be rare, and we could pollute our atmosphere with impunity. Disappearance of the ozone layer would not matter as other pollutants would form a heavy protective cloud.

Heart

Coronary artery disease commonly causes premature death. The coronaries should be replaced by a porous lining to the left ventricle so that oxygenated blood can diffuse freely throughout the myocardium. We could then eat more animal fat without any burden of guilt. All farmyard animals would once again be equal, particularly pigs.

Life cycle

The more dependent times should be accumulated at the beginning so that they can be passed, with the optimistic view of independence and health to follow. Psychiatric disease and depression would disappear, and there would be a better balance of payments, with one's earning capacity increasing throughout life.

We should be born into infancy, and after 9-12 months develop into old age. This phase would last six weeks before the transitional stage of adolescence. Six weeks later, the middle aged adult would emerge and remain for about 10 years, followed by the gradual change towards young adulthood throughout the rest of life.

The matter of death has yet to be resolved: we are divided about whether this should occur before birth or at the end of adolescence. There are cogent reasons for both suggestions. Earlier death allows the person to complete it early, so that constructive living can follow. Compulsory organ donation would be essential as the condition of these organs would be excellent. Death after adolescence would allow society to develop less animosity towards the individual by having him or her "out of circulation" for a while. The duration of death also is to be resolved. Perhaps this should be decided on an individual basis by the community.

Sex

Sex needs to be demystified and safe. We recommend an area on the right shoulder which changes colour to indicate sexual receptiveness. Green is a "willingness" to participate; amber indicates an imminent "headache"; red recommends that no advances be tendered. The shoulder location enables people using public transport to identify a suitable partner for the evening and would ensure the continuation of chivalry as men would offer seats to women.

We have submitted this paper in the belief that the Cosmic Creator has limited time and probably reads only the *BMJ*. Should the Creator be interested, we have some further suggestions.

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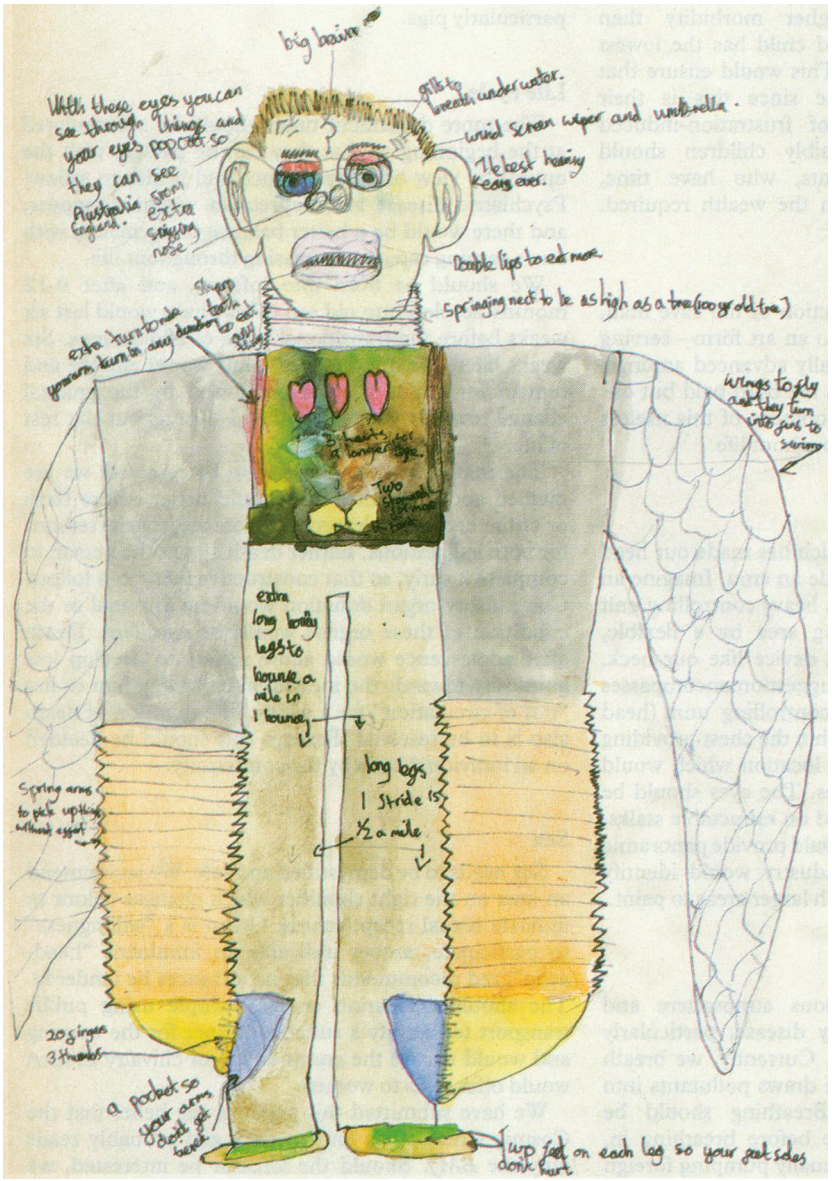
BMJ 1995;311:1669-76

Inspired by the idea of redesigning the human species, we asked other people of various ages to give us their thoughts on the matter. What follows is a medley of their contributions.

Sharon Davies, technical editor, London, aged 38: When I was approaching my finals in physiology our teachers warned that we could be asked to design a mark 2 human to assess our grasp of physiology and our worthiness for an honours degree. This filled me with horror. Although my knowledge of physiology was then the broadest it would ever be, and although I delighted in seeing parallels across tissues and organ systems, I seemed to have only the barest grasp of the mark 1 human, so how could I design a better one?

We had had to grapple with so much complex information in the final two years of the course—information that is now well known to A level students but seemed then to be at the frontiers of scientific knowledge. The sodium pump was a force to be reckoned with. It was exciting to count ouabain sensitive sites in isolated tissue preparations and to measure the pump's activity under controlled conditions so that we could learn its secrets. The sodium pump seemed to me to be the basis of everything. Perhaps it was one of the first things to evolve in the primordial soup? But why? And how?



Laura Gallagher, age 10, Holmfirth, Yorkshire

How could all this fascinating detail help me to design a better human? Panicked, I centred on the retina. Why did light have to pass through the whole thickness of the retina to reach the cells that could react to it? Why not have the light receptors first? Something to do with embryology, no doubt. Why not have nerves that could regenerate and regain function? Why not be more like flatworms, able to regain complete nerve function when severed by inquisitive scientists? Why could we not have teeth that renewed themselves throughout life?

So much for the perspective of someone in their early 20s. Now, in my late 30s, I would be concerned much less with the detail of how the body works but more with what happens when it goes wrong. I would like to get rid of disease, of course, and I wonder why childbirth has to be so traumatic for mother and baby. You are not always at your best in pain; why not have hip girdles that can accommodate babies and expand painlessly or in a way that is not interpreted as pain but as pleasure?

As I age I am beginning to notice the effects of the exponential decline in the number of my brain cells. Why should we start losing brain cells so rapidly, so young? I could certainly do with them now, and I envy my 5 year old son's plasticity of thought as he bounds from subject to subject, taking in two or three at a time. Yet when I asked him how he would design his mark 2 human, he drew two heads so that the new human could think about even more things at once, as well as being able to see all the interesting things that were going on around him. I wonder about how all these thoughts from the two heads would be integrated (his picture indicates no central computer or centre to do this). But then presumably this is not necessary as the brains are both in peak condition—he does not know otherwise. And his mark 2 human has five legs, to move quickly. Wheels would be no improvement on the Maker's original model—hardly aesthetic or human—and having five legs should be better than having two. But I don't fancy scuttling about like a spider: I want to stride, run, and look.

When we thought of asking children to help us redesign the human species I found the idea stimulating rather than horrifying. We thought that wheels and wings would be popular choices for children aged 5-8, but in my son's class they did not feature. The head seemed to be the most important part—more heads, more eyes, more mouths, please. Like the student grappling with physiology, these 5 year old children are grappling with the fascination of how their bodies work. They do not think that their body needs fundamental improvement.

Arthur Smith, comedian, London, aged 41: As a comedian writing in a medical magazine I find it encumbent on me to make a series of jokes about penises. This, along with testicles, is certainly the part of the male body that causes most trouble and could use a radical rethink. For the sake of British comedy, I would not wish them to lose their comic potential. Similarly I would not wish them to be elsewhere on the body, like on the head, because they need to be hidden away for innuendo to have any meaning.

No, my proposal is that the penis and testicles be detachable, such that you can keep the whole set at home in a drawer. So, for example, when you're playing football, there's nothing banging about irritatingly between the legs. If, of course, you've got a hot date after the football, you could take the set with you in an airtight plastic box. You need not reattach it immediately after the game—you might wish to take it out in the pub, put it on the table, admire it, and feed it peanuts. (Actually, thinking about it, this is what rugby players do anyway.)

Jed Smyth, age 8, Boston: "He has a tree on his head so he can always be in the shade"

The system would be more workable if the function of urinating were given to some other organ, maybe the knee. Then, if you are in a monogamous relationship, you might want your partner to have your penis while you are away on business. If you're gay, you could try each other's on. I must admit I can't (if you'll forgive the expression) get my head round how possible a detachable a vagina would be, but I think that's an exciting idea too.

In fact, why not detachable everything? When you cuddle someone in bed, wouldn't it be much easier if you could both remove an arm? Want to get your ear pierced?—easy, you can drop it off at the shop on the way to work and pick it up on the way home. Instead of being forced to walk round clothes shops, you could send your legs off with a friend who'd buy your trousers for you while you sit on your torso at home and watch the telly. Headache? No problem, you can unscrew your head and leave it in bed while you go off to the Jim Davidson gig; you won't miss it.

If the detachments were universal we could all try every bit of each others' bodies on. We could have parties where everyone has changed their parts around. Or you could, for example, swap your own arms and legs round—which would certainly be a challenge to the worlds of dance and fashion.

I realise I have raised ethical and philosophical questions: if I have your head and you have mine, am I me or you? But this very connundrum may lead to the death of the individual ego and therefore a more egalitarian world all round. We are merely the sum of our parts, and my parts are yours. Here is my penis, and can I have your nose?

Forgive me this ridiculous idea, dear readers, but it's Christmas and I hope that you might be pleased for me, that I have realised an ambition. Usually it's metaphorical, but this time I have literally talked bollocks.

Steve Jones, geneticist, London, aged 51: The *BMJ* wants to redesign humankind. But every doctor knows that humans were never designed in the first place. If they had been, they would not break down in such complicated and irreversible ways. Instead, they—we—evolved; *Homo sapiens*, like the camel and the AIDS virus, is the result of a series of successful mistakes.

All doctors know (I assume) the stirring words from William Whewell, inventor of the word "scientist," on the title page of *The Origin of Species*: "But with regard to the material world, we can at least go so far as this—we can perceive that events are brought about not by insulated interpositions of Divine power, exerted in each particular case, but by the establishment of general laws." What scientists lack is imagination. To redesign the human genome is far too modest a challenge. Instead, they should take on Divine power, rewrite the general laws, and let evolution take its course.

I propose to cancel one of the unduly neglected laws of nature: that of regression to the mean, coined appropriately enough by Darwin's cousin, Francis Galton, the first person to plan a genetic redesign of the human race, albeit with selective breeding rather than high technology sex. He noticed that parents with extreme characteristics—very fat, say, or very stupid—tend to have children who are obese or dim but less excessively so than their progenitors: they were intermediate between their parents and the average for the population as a whole.

We know that this regression to the mean happens because such characters are controlled by lots of genes, each with a small positive or negative influence. The child inherits a mixture from its parents, some increasing and some decreasing the trait. As a result, there is a triumph of the average; extreme characters are, in effect, diluted away each generation.

But imagine what would happen if the law was abolished! Children would surpass their parents for any character one might like to name. Tall parents would have even taller children, and the offspring of intellectuals would be quite intolerably smart. And, of course, all the progeny of skin specialists would be brain surgeons.

Come to think of it, for the past 16 years the experiment has been well under way. The rich and healthy are getting richer and healthier; the poor and sick more so. The gap between them is widening as each moves away from the mean. And when wealth really starts "cascading down the generations"—safe from tax, the great regressor—the differences will become even greater. Come back, Sir Francis, all is forgiven!

James Drife, obstetrician, Leeds, aged 48: The European Design Bureau is disappointed that plans for the human reproductive system were not submitted to its Brussels office at an earlier stage. The current design falls short of European Commission standards in several respects.

On the credit side, the mark 1 system works. From two prototypes, Adam and Eve (designed before European guidelines), the production run now numbers five billion. Unfortunately effectiveness has been achieved at the expense of safety. The fundamental design flaw is that the female ovulates every lunar month for 37 years. This is totally unnecessary. With low infant mortality, only two offspring per pair are required for replacement. The female does not need to ovulate 400 times to achieve this.

I suggest that humans should become seasonal breeders. Puberty should be at 18 and the menopause at 45, with ovulation occurring annually. The mating season should be around the winter solstice and the breeding season in the autumn, to avoid clashing with the proposed rugby internationals. Concentrating parturition into September will have advantages for medical school curriculums. It will also allow obstetricians to spend the other 11 months writing medicolegal reports on one another's activities. Their work pattern will therefore hardly change.

An annual mating season would release humans from their morbid, year round interest in sex. Several

Ana Elena Olguin Toledo, age 9, Mexico City: "She has many eyes to see everything, and big feet to walk and run quicker, and lots of fingers to help out with arithmetic"

James Tordoff, age 10, Holmfirth, Yorkshire

tabloid newspapers would cease publication, thereby improving the quality of life in Britain. If male aggression were confined to a short rutting season, the benefits would be incalculable. This appallingly vicious species rejoices in its history of war. How much better if, like gorillas, human males spent their time huddled together in groups inspecting one another for fleas.

For the female, monthly ovulation carries many health risks in addition to the chance of unwanted conception. If she avoids pregnancy she menstruates, thus spending nearly 20% of her time between 13 and 50 coping with bleeding. The vagina, unlike the rectum, is not equipped with a watertight sphincter, so incontinence of menstrual flow is a constant worry.

Synthesis of prostaglandins in the uterus brings painful cramps. Monthly ovulation also increases the risks of pelvic infection (via receptive preovulatory mucus), functional ovarian cysts, and anaemia. It causes ovarian cancer, and the repeated surges of oestrogen and progesterone increase the risk of breast cancer.

Regarding the breast, a serious design flaw has been to include a large amount of fat, which acts as an attractant to the male. As noted above, sexual incitement is the last thing this species needs. Mixing sexual and nutritional roles in the same organ means that many human females are now too embarrassed to suckle their young. More importantly, the hormone sensitive fat is carcinogenic to the mammary gland itself. Breast cancer (rare in most species) now affects 1 in 12 human females in some countries. It is imperative that the sexual fat is moved. I suggest it should be over the scapula, where it can be caressed during coitus without causing cramp to the male. The mammary gland should remain on the anterior chest wall. This simple change would increase the rate of breast feeding to 100%.

Jo Brand, comedienne, London, aged 38: Given carte blanche to make any changes I could in the evolutionary process, I would start on the now obsolete functions that were assigned to both the sexes when we were running around as hunter-gatherers. In the days of Brigitte Bardot and skimpy fur dresses, men needed to be strong and fast. Those who weren't got sat on by a brontosaurus and snuffed it. These days, however, you won't catch man hunting his own food unless he is a toff, so he doesn't need the superior strength that he now uses sometimes to lord it over women. Therefore, I'd hit contemporary man where it hurts and whack him in the testosterone supply area. While I'm at it, and considering modern man is so obsessed with breasts, I'd give him some and look forward to a Page Three full of Darrens and Daves and whingeing down the pub about ill fitting bras. Once men realised they were not stronger than women, this would bring about many positive changes in women's lives, including less physical violence, more economic equality, and a very tedious time for men working on building sites.

I would also attempt to genetically engineer out of existence the urge human beings have to compete. This would produce happy, stable human beings and bring about the downfall of the Tory party. It would have saved me many sleepless nights before sports day as a teenager, when I knew I would be left sadly trailing like the proverbial slug in the 200 metres.

As far as health is concerned, I would strengthen the human body to resist the ravages of alcohol and tobacco, if only to stop the holier-than-thou health dictators and the thin people on exercise videos who shout so much you want to drown them in lard.

Emotionally and spiritually I wouldn't make too many changes to human beings, because I think people are fascinating as they are—disturbed, creative, weak, selfish, boring, spiteful, silly, stupid, occasionally inspired, and stubborn. Men wouldn't be such a challenge if they lost these qualities.

There is a huge tension between the human instinct to preserve life and the evolutionary process, which is geared to keeping populations down. In this case I would feel obliged to go for survival of the fattest. I would try to combat racism by somehow making different races hugely attracted to each other. So instead of race riots, the police would have their work cut out trying to separate lots of people hugging.

From a purely selfish point of view, I would return women to the vital statistics of the cave woman, who was supposed to have measured 96-90-96, thus making me the Kate Moss of Jurassic Park. I would speed up the aging process so that people were forced to pack as much into a short life as possible rather than constantly looking to the future to fulfil their dreams. Finally, I would make all the negative attributes of human beings a source of magnetic attraction, so that the perfect human being in everyones' eyes would be an aging, red haired, bald, weedy, spotty nerd. Then all the beautiful people would be forced to develop a personality just like the rest of us. Bitter, me? No.

Drummond Rennie, medical editor, San Francisco, aged 59: The telephone call from the *BMJ* came while I was on my way to see a man about a hip: my hip. As I drove across the Golden Gate bridge to my surgeon's

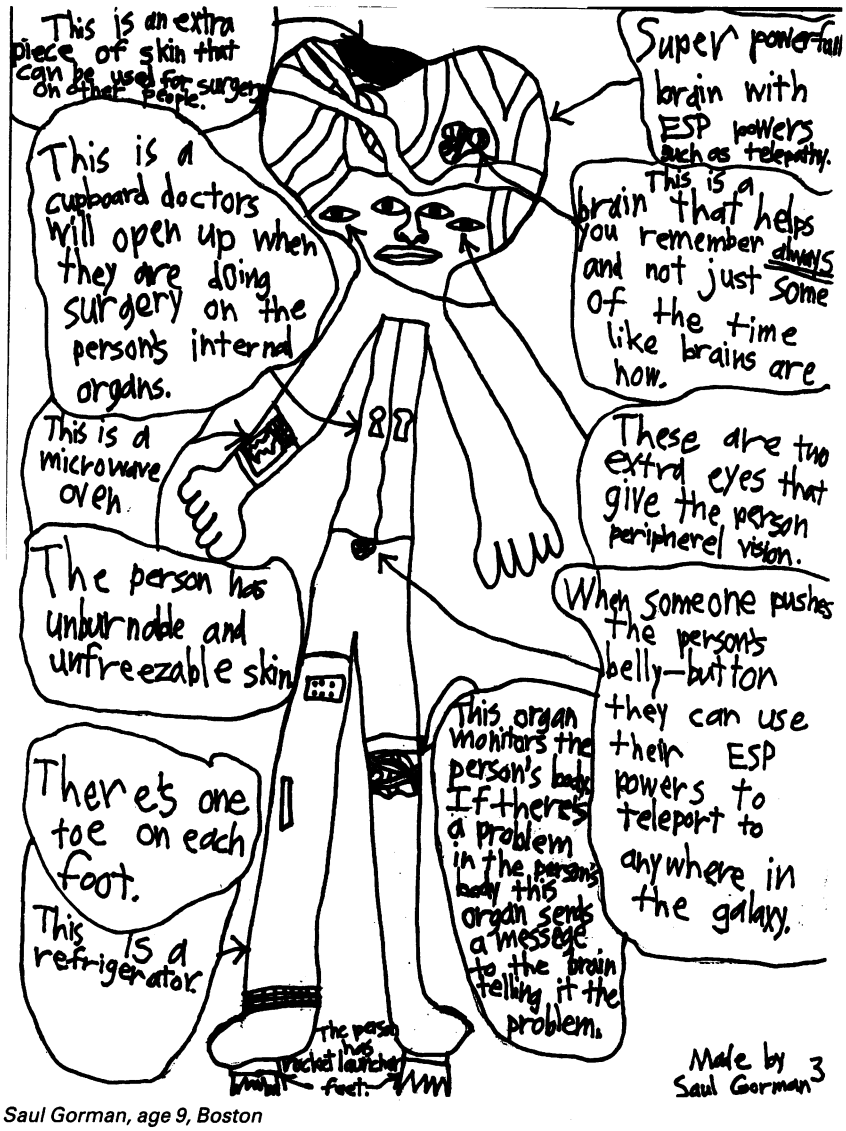
office, to meet the man who would do my replacement, I felt too preoccupied by the thought of the coming encounter (and, let's face it, too apprehensive) to concentrate, so I thought I'd save myself trouble by putting the question to the surgeon himself: as a Human to a Re-engineer.

Odd fellow, Dr Moisseiff*: bald as a rocket nose cone; cold handshake; tinny voice. Still, he was an orthopod: the certificates on the wall said so. Better put him at ease. "Dr Moisseiff," I said, "or may I call you . . . er. . . ," I squinted at the nearest framed testimonial, from the Schwabian Polytechnik Institute, "er, Leon? We are professional colleagues."

There was a long pause. "I . . . AM . . . AN . . . ORTHOPAEDIC . . . SURGEON," he intoned.

"Quite so; very good point. Well, er, Dr Moisseiff. . . ." Was I stammering? Get a grip on yourself. Humour the man. I took a breath.

"Dr Moisseiff, mind if I sit down? . . . Does that bleep mean you do mind, or that I may sit? Well, anyhow, I've been asked how one re-engineers a human being. You'd say it was the wrong question: not how but when, you would ask, and why wasn't it done earlier? I don't want to put words into your mouth, but I'll bet you're way ahead. Not just the joints, either. I agree with you there: simplistic hinges, boring balls and sockets. But, say, the bowels. Replace the gut with vinyl gutterspouts and there's an end to colitis, obesity, and Tagamet. Just have to remember to clear out the dead leaves in November, eh? . . . Just a joke, Doctor." For goodness' sake, shut up, man, you're babbling. But why doesn't he blink? Come to mention it, why is



Saul Gorman, age 9, Boston

Anonymous girl, Orizaba, Veracruz, Mexico: "This being is going to feed the hungry, and that is why he has four arms"

his stare so, omigod, phosphorescent? And it hadn't been a bleep: more a ping.

"Of course, Dr Moisseiff, I can see that we're not quite there yet, are we? Sex, for example. With present day materials, the collision would be dreadful; sound like two dustbins toppling down an escalator. On the upside, dysfunction would be inconceivable, if you don't mind the pun. . . . Look, Doctor, help me out here; nod. One nod means you do mind the pun; two you don't. . . . OK?"

Actually, not so much babbling as dying publicly, like a drunk actor. But, so help me, I can't stop.

"The interesting thing will be the brain. Obviously, all you have to do is scoop out the neocortex and replace it with a couple of those surplus chips: you know, the ones that can't cope after more than 27 decimal places. I mean, Doctor, get real. Most of us get our shoes muddled and that's only two. Anyhow, even two defective chips should be enough for all the virtual living those who want to get a virtual life would ever want, or in this case virtually want. And think of the space freed up: the brain box would be an empty echo chamber, except for the motherboard and those pesky dust balls. I imagine it would feel rather like being a Republican: inner peace, a tangible god, and regular upgrades. Huge opportunity for quadraphonics, of course: just swivel the ears inward and connect to the cable channel: sound to die for. Do chips die?"

Holy cow! Where's this going? Did I brush my teeth this morning? If he'd just open his mouth! . . . Can I smell sump oil?

"But I have to admit, Dr Moisseiff, I'm glad we haven't got there yet. OK, I'm not so obtuse as to imagine you can't program the chips more usefully than our present so called minds. If the UN photographer can get 300 heads of state, most with blood and other people's money on or in their hands, to smile simultaneously when he says 'cheese,' programming

*To avoid libel, and so as not to provoke him into murdering me during the operation, I have changed the name of my surgeon to Leon Moisseiff, in honour of the chief consulting engineer on the Tacoma Narrows Bridge. This 2800 foot suspension bridge was built in the 1930s. It collapsed on 7 November 1940 in a brisk breeze (40 mph), with the loss of one life: that of a small dog. A film of this event shows the bridge twisting and undulating in a periodic, progressive, and ultimately disastrous fashion. I assume that all readers will be able to make this connection, but think it unlikely that anyone much cares.

Tamara Evan, age 5, Letchworth, Hertfordshire

the chips to get the owner to hold politically correct views on, say, women's rugby, euthanasia, or Virgil's unfinished hexameters would be child's play.

"No, what worries me, Doctor, is that you'd have to be barking mad to agree to having your own brain vacuumed out and replaced by a few cheap electronic devices, wouldn't you, Doctor? . . . Doctor? . . . Dr Moisseiff??"

"I . . . AM . . . AN . . . ORTHOPAEDIC . . . SURGEON."

Hugo Brown, medical editor, Mexico City, aged 54:

Small is functional, if not always beautiful. If man is to survive present demographic and economic trends, the only sensible option for the new human being seems to be downsizing. This is not as revolutionary as it sounds; the historical and archaeological records show that as recently as a millennium ago humans were as much as a fifth smaller than they are today.

From the point or view of evolution, this doesn't make sense. When a species multiplies as irrationally as ours, when our vaunted science fails so persistently in its efforts to expand sources of food and other elementary means of survival, the only logical alternative is to modify the species itself. This has been attempted quantitatively, and this has failed miserably: birth control is evidently not a comprehensive solution. The only alternative left now is to approach it qualitatively, and from this point of view the most obvious option is downsizing.

The extent of this change would be determined by the availability of elementary resources, and this could cause debate between regions. In Japan, for example, the prime consideration would be space; in most of Africa, it would be food; in many parts of the Middle East, it would almost certainly be water. The problems that this poses in the macro planning of the downsizing have to be carefully addressed.

Downsizing must be carried out over a considerable time frame. This is essential to avoid economic disruption, as the consumption patterns of a downsized population could change drastically, possibly requiring huge investments in downscaling by the motorcar, foodstuffs, housing, and garments industries. Some limits would also have to be imposed on the degree of downsizing by the relative sizes of other living creatures: if pests such as rats were to acquire sufficient relative size to become downright menaces, some of the advantages of downsizing would be lost (although certain sectors, such as the weapons industry, might thrive). We must also consider the living beings that, in our present state of dimensional relations, comprise economic resources: a cow several times taller and several hundred times heavier than a human being might, without adequate technology to handle it, seem rather less attractive.

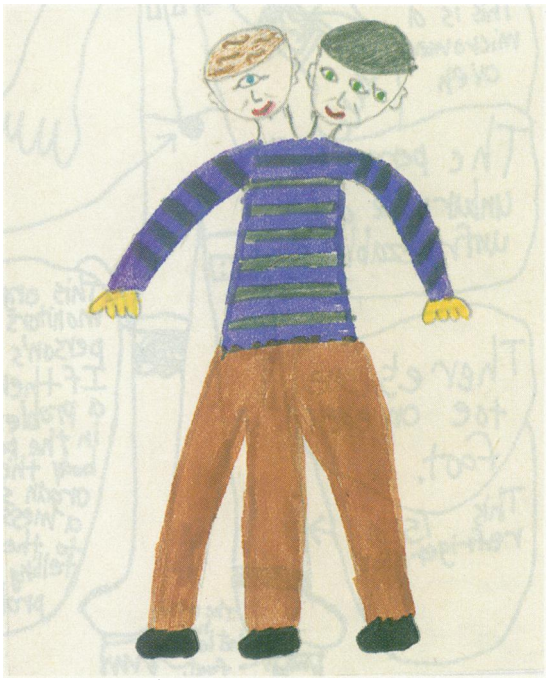
One solution would be to include most of the animal kingdom in the downsizing programme, but this would generate costs that not all regions could countenance. Another possible option would be to limit the downsizing to around 50% (it would be left to a committee to decree precise proportions), but it is debatable whether this would constitute a long term solution. To prevent cheating, the process would have to be supervised by an international body—some countries might shortsightedly interpret size as conveying geopolitical advantages, and thus drag their feet.

Finally, there remains the issue of technical feasibility. It must be remembered that the downsizing contemplated would be greater than the 20% growth achieved in a millennium, and that the time frame must be drastically shorter. Randomised controlled trials are needed to ensure uniformity of results and the safety of procedures, especially where the nervous system is concerned (a careful study of hypophysiary dwarfs is indicated, and might even improve our knowledge of how the nervous system works). The results would probably compel a whole series of compensatory subdesigns, which would certainly complicate the project and some of the economic perspectives involved. But because the challenges of reality are so grave, a few operational problems of this kind are a small price to pay for saving humankind from itself.

Kenneth Calman, chief medical officer, London, aged 53:

I boldly took the challenge to redesign the human body
And settled pen in one hand, in the other one a toddy.
My mind began to wander, creative tension filled the air

A longer version of this paper was presented to the Committee for Optimisation of Resources by the Costs and Productivity Department of the Planning Bureau of Future Visions Inc., a marketing planning consultancy.



Andrea Negru, age 10, Iasi, Romania

Alexandru Spătărelu, age 9, Iasi, Romania

But not a great deal happened; I'd a feeling of despair.

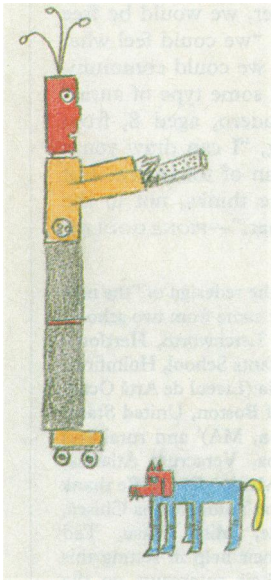
My first enlighted thought was that the body should be smaller
And by comparison myself, of course, be looking that much taller.
And everlasting hair would be a feature quite ornate—
I'd look young, sophisticated, with no bald and shiny pate.

And better venous access—taking blood would cause no fear;
I'd straighten out some plumbing and make migraine disappear,
Abolish piles and hernias, reduce the prostate size—
Put an end to getting up at night, yes that would be the prize.

My thoughts were clearly focused now: what else to redesign?
I'd have a body that was tough and fit and naturally slim line
My metabolic rate will change, with extra joules I'll cope, I'll
Have bread and butter pudding and maintain my lipid profile.

For all GPs who must respond to ever more demands
I'll certainly arrange to fit an extra pair of hands
And for hospital consultants who have meeting after meeting
An enlarged gluteal fat pad to accommodate their seating.

My skin would be immaculate, with not a spot or wrinkle;
I'd be shaving only weekly and have eyes that always twinkle.



Ilinca Elena Nichita, age 9, Iasi, Romania

But these thoughts are rather trivial; the subject is more serious
So three proposals I'd suggest, without seeming too imperious.

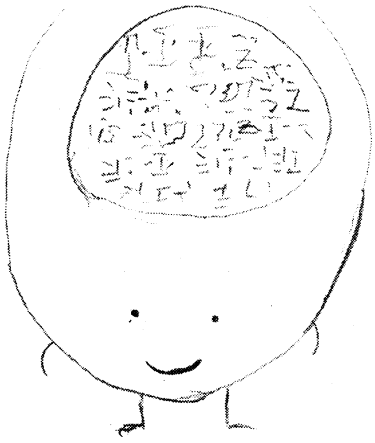
First concerns a vital organ which is present in us all
But sadly far too often is vestigial, or small.
By now you will be wondering, so I'm coming off the fence:
I'd like to see enlargement of the organ of commonsense.

My second is advancement in how to best communicate:
To listen, and to share as well, not just pontificate.
I'd arrange it so the tongue was well connected to the brain
And sensitivity occurred before the words were set in train.

My third's a group of features which I hope are not obtuse
They include a sense of humour (anatomically diffuse);
To say a word of thanks at times, use therapeutic touch—
Their stress relieving properties don't really cost that much.

If doctors were designed this way the clinical reaction
Would be positive practitioners, more patient satisfaction,
Relieving pain and suffering and helping scars to heal,
With the very clear objective: to improve the commonweal.

Stephen Jay Gould, evolutionary biologist, Cambridge, Massachusetts, aged 54: I am grateful for eyeglasses and arch supports. We should, by all means, tinker with evolution's legacy. A little fine tuning never hurts. But no general overhauls, please—for I trust the natural gift of our Darwinian flexibility far more than the historically contingent whims of any self proclaimed improvement committee. Humans have been stable in bodily form and mental constitution for 100 000 years. Evolutionary theory predicts that successful, widespread species with large populations will not change substantially for long periods of time: consider rats, pigeons, and cockroaches as prototypes.



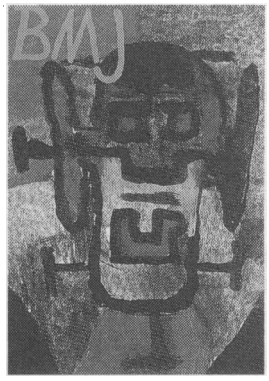
Julian Ernesto, age 13, Amecameca, Mexico: "The transparent man is as fragile as an egg. His mind and his feelings are very powerful, but as his body is fragile he is not violent. You can read his ideas in his mind"

The folks who painted the caves of Lascaux and Altamira some 20 000 years ago, before the origin of agriculture, are us. One look at the complexity of their art will confirm the continuity of mental sophistication. Consequently, everything that we call civilisation—from the invention of agriculture to the first establishment of cities—has been accomplished without change of brain or body. Who knows what else we might achieve with the same equipment? It ain't broke, so there's nothing to fix.

An irony of recursion also dictates that we leave well enough alone. Our brains have been cobbled by evolution, not created as optimal machines. We are very poor, and probably constitutionally so, at all manner of mental operations now important in civilised life—thinking about probability and understanding continuums (with a brain that loves to work by dichotomy)—for example, I would never entrust this faulty product of evolution with the task of revising its own evolved structure.

Dominique Maxwell, age, 5, Letchworth, Hertfordshire

Cover story



Cover by Radu Stefan Pintile, age 8, Iasi, Romania

"The present human form is the first draft of a cosmic design. Our concern is that the Designer has derived such amusement from us that He may not proceed further towards perfection." So begins the paper on p 0000 and so began for us a search for other ideas on how to redesign the human species. Three editors, a geneticist, a science writer, and two comedians responded. So too, with words and pictures, did schoolchildren in Yorkshire, Hertfordshire, Mexico, Romania, and Boston, Massachusetts. Some of the results appear in the previous pages.

"There were some constant features that turned up," wrote Liliana Santirso, coeditor of the *BMJ*'s Mexican edition, who liaised with schools in and near Mexico City. "Practically all the children seemed to think that the new man needed more organs of the senses—eyes, ears, and occasionally noses." Edgar Emilio Morales Delgado, aged 8, drew a man with ears on his legs "to hear the earth better." The smaller children seemed to think that the new man should be an extraterrestrial; and in rural areas, hats were incorporated as part of the anatomy.

"The kids all loved the idea," wrote Ted Vassallo, an artist and teacher in Boston, "but it was very hard for them to produce good work when there are so many choices." Saul Gorman, a 9 year old whose picture appears on p 1673, reads science journals in his spare time, and 8 year old Jed Smyth drew a man with a tree in his head so that he could be in constant shade (p 1671).

The picture on the cover is by Radu Stefan Pintile aged 8 from Romania. Tudor Toma, editor of the *BMJ*'s Romanian edition and compiler of pictures from children in Iasi, noted the large number of images of princes and princesses, as well as a strong tendency among the boys to increase the fighting capacity of the new individual.

The title of one picture, "A better bloke" (p 1672), reflects the widespread impression that all is not well with the soul of the human being mark 2. "Because his life is very short, he is compelled to live it at maximum intensity," explained José Luis Javier Pirez, aged 13, from Mexico. The human being mark 2 "will change the earth," said Jesus Hermillo, aged 7, from rural Mexico, "because he buries garbage, destroys the machines that make bombs, and feeds the needy." Aurelio Cuyache, from the same class, pointed out that "what he says appears in colour so that everybody can know he is telling the truth."

Other children had more practical concerns. More and better arms, legs, eyes, and ears featured heavily in drawings from all four countries. "Two brains that know everything, 32 inch colour TV as a face, six eyes, speakers as ears, four robotic arms, wings, refrigerator body, machine that does your homework, roller blade rocket feet," was the wish list from Bobby Whelan, aged 9, in Boston. Nathan Hall, aged 11, from Yorkshire thought the new human would benefit from "eyes in the back of his head and four ear drums, a nose that can smell things a mile away, two hearts so when one dies the other one works; wings with extra muscles to fly faster, and gills so he can breathe under water. Ana Elena Olguin Toledo, aged 8, wanted "lots of fingers to help out with arithmetic" (p 1671), while Leo Stockford, aged 6, from Yorkshire suggested "two mouths so that you could eat your food faster and go out to play more quickly." Carlos David Leal Fulgencio, aged 7, from Mexico drew a man with electric hair, five mouths, and three heads. The electric hair was to avoid the necessity of combing, he explained. "If anyone tries to put a comb in it, they get electrocuted." The lively new human drawn by Hayley Armitage, aged 9, from Yorkshire had "windows to see how healthy her body parts are; veins in her feet so you can see her blood supply" —and special dancing boots to keep her healthy.

But some sorts of evolved being could not readily be drawn. Damian Alejandro, aged 14, from Mexico explained that "the shape of the normal human being is determined by the matter of which he is made. If we were to get rid of that matter, we would be free men." By fully using our minds "we could feel what is going on in the environment, we could communicate with sensations, smell, and some type of aura." And Lorena Córdoba Embarcadero, aged 8, from Mexico refused the task, saying, "I can draw you a child if you want. He is the man of tomorrow. But his problems are in the way he thinks, not in the way he looks, and I can't draw that."—FIONA GODLEE, MARGARET COOTER, *BMJ*

The children who participated in the redesign of "the new human being" were aged 5-14. They came from two schools in Enggland (St Francis's College, Letchworth, Hertfordshire, and Upperhong Junior and Infants School, Holmfirth, West Yorkshire); a school in Romania (Liceul de Artă Octav Băncil, Iasi); a school in a suburb of Boston, United States (The Meadowbrook School, Weston, MA)' and rural and urban schools in Mexico (Orizaba, Veracruz; Atlautla, México; Amecameca, México; and Mexico City). We thank Mrs Jesica White, Chris Willis, Tudor Toma, Maria Chiscă, Doina Spiridon, Ecaterina Pintile, Mihai Băsu, Ted Vassallo, and Liliana Santirso for their help in setting this project for the children and for their comments on the process and the results.